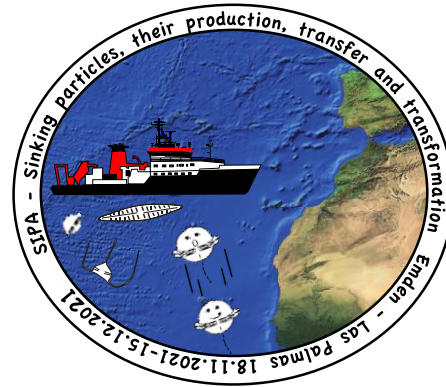


RV MARIA S. MERIAN
Cruise MSM104 (GPF 20-1_69)
18.11.2021 - 15.12.2021
Emden - Las Palmas

SIPA
Sinking particles, their production,
transfer and transformation

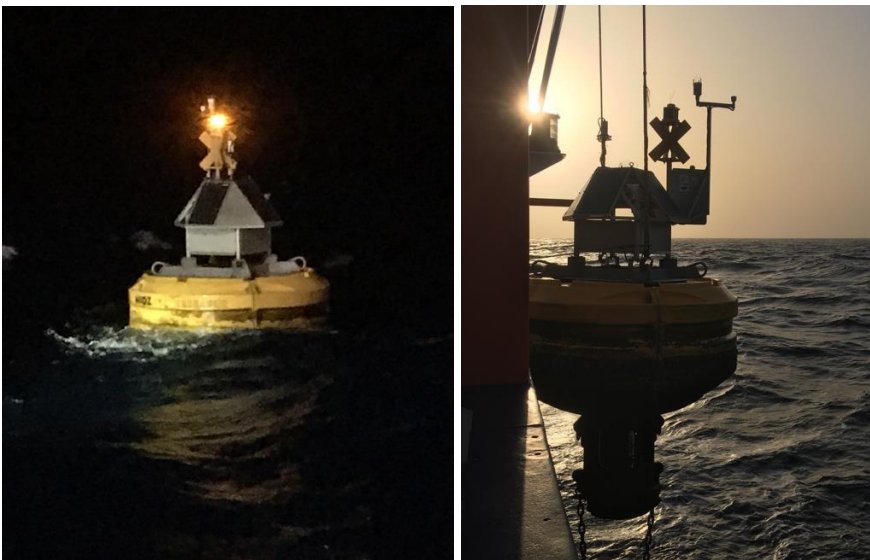
Weekly Report No. 4
06.11.21 - 12.12.21



This week, beautiful summer weather and surface water temperatures of 27°C caused that we all could enjoy the subtropical december "summer".

On Monday morning, we were pleasantly surprised by several small presents in front of our doors. "Sinterklaas" who had intense cooperation with German, Dutch and Dutch/German scientific and ship's crew members, had found out the location of the ship and had managed to send several of his "roet-pieten" to bring small presents to all "brave kinderen" (translated: well behaving kids) on board.

On Monday, early afternoon, we ended our station work on the slope-open ocean area off Mauretania. After recovering our drifting trap that had collected samples for 6 successive days, we headed south to our last research area south of the Cape Verde Island. On our transit to the south, we quickly left the cold, windy upwelling region and came into more quiet, subtropical conditions.



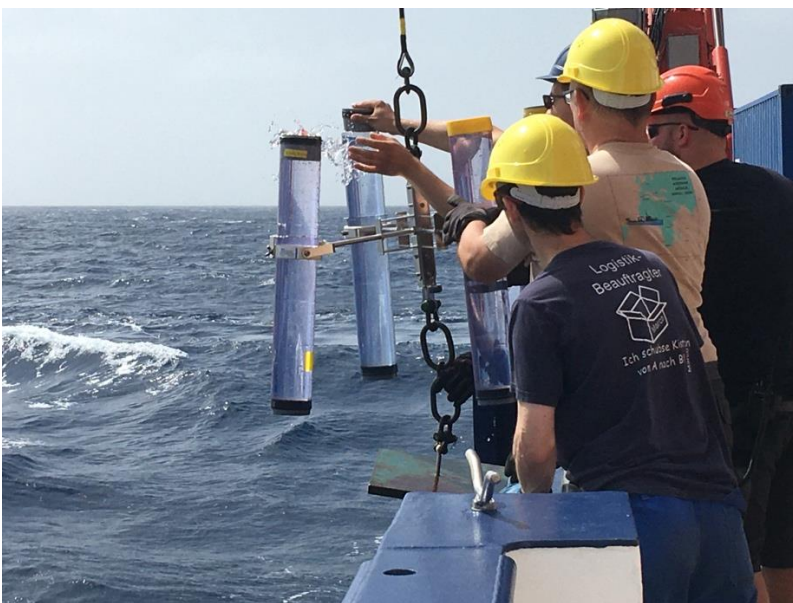
Picture1. Left: Dust Buoy "Laura" at night. Right: Recovery of the Buoy in the morning hours.

The transit formed the ideal time to start an aggregate forming experiment, with the water we collected in the newly formed active upwelling cell. Water upwelled to the surface contains a lot of nutrients which can be used by plankton to grow. When the plankton dies or is being eaten it is being decomposed by microorganism and the carbon molecules are released again to the ocean water as so called "dissolved organic carbon" (DOM) and as such does not contribute the "ocean carbon rain". We have however, strong indications that this DOM might clump together when being stirred to form new larger particles that than in turn sink to the ocean floor.

In an "rolling tank" experiment RECEIVER-Unit participants from the MARUM, the University of Oldenburg and the AWI cooperate to investigate this process. Of main focus are the composition and age of these newly formed aggregates. First results of the aggregate forming experiment appear very promising. Now at the end of this week, small aggregates have been formed in the roller tanks. These are now carefully being "harvested" to be able to study their composition and age at the MARUM (Bremen), the university of Oldenburg and at the AWI (Bremerhaven).

On Wednesday morning, we resumed station work by releasing our drifting trap and recover the NIOZ sediment trap mooring. This mooring contains three traps that had successfully collected particles at the two-day resolution during the last year. We used the night hours to locate the position of the NIOZ dust buoy "Laura". Although an iridium sender sends information about its position twice a day, its exact position can be best located during night time when its strong flash light reveals its position. During the day, the buoy spends shadow in the well-lid upper ocean which attracts many marine organisms e.g. the beautiful colored Mahi Mahi. In the light beam of the Maria S. Merian it was well visible how these elegant large fish circled the dust buoy together with numerous smaller bonito.

In the early morning, we started with recovery of the buoy such that it could be serviced and released again for another year of sampling in the ocean. Everything went extremely well and the buoy could already be released in the for the NIOZ "record speed" of only 3.5 hours. After redeployment of the buoy station work was resumed by investigating the water column with CTD and collecting particles from the, for this open ocean oligotrophic region, surprisingly thick bottom nepheloid layer at 5100 m water depth.



Picture 2. Last Drifting trap samples are being recovered.

Station work was ended at Friday by redeployment of the NIOZ sediment trap that is now programmed to collect samples until January 2023, followed the collection of our drifting trap. In 2023 MARUM participants will be back at this location with the Dutch research vessel PELAGIA to service the MARUM sediment traps and collect additional sediment and suspended matter samples in the region. The MARUM and NIOZ have a long-term collaboration and in the past the NIOZ team have been joined several GeoB and MARUM expeditions where we jointly serviced our sediment trap moorings and the NIOZ dust buoys.

We are now on our transit to Las Palmas, which we intend to reach on Wednesday morning. We are very happy and grateful that we got the possibility to collect the many excellent data and samples from the upwelling area off Cape Blanc and the research area south of the Cape Verde Islands and to be able to continue the long-term monitoring of these unique oceanic regions

Our severe thanks go to captain Björn Maass and his excellent crew for the very pleasant and professional cooperation. We also thank the Review Panel German Research Vessels (GPF), the German Research Foundation (DFG) the German Research Fleet Coordination Centre (LDF), the shipping company Briese Research and everybody else, who have made this expedition possible.

on behalf of all cruise participants
met beste groet van de blauwe oceaan

Karin Zonneveld
(MARUM – Center for Marine Environmental Sciences at the University of Bremen)